E000P-912000-06
Date:08/01/01

ICD_PSS_to_RSC_E000P-912000-06.doc

INTERFACE CONTROL DOCUMENT

PERSONNEL SAFETY SYSTEM

to

BEAMLINE USER REMOTE SHUTTER CONTROL

ARGONNE NATIONAL LABORATORY
ADVANCED PHOTON SOURCE

PREPARED BY: _____ _____

Steve Ross, Date
PSS Hardware Manager, ASD

REVIEWED BY: _____ _____

Nick Friedman, Date
PSS Systems Manager, ASD

APPROVED BY: _____ _____

Jon Hawkins, Date
ISI Group Leader, ASD

TABLE OF CONTENTS

Error! Not a valid heading level range.

LIST OF FIGURES

FIGURE 3-1 INTERFACE BLOCK DIAGRAM 6

ICD PSS to Beamline User Remote Shutter Control

ACRONYMS

The following are some of the frequently appearing or unique acronyms used in this document. This list is provided as a quick reference for the reader's convenience.

APS ..... Advanced Photon Source
BL..... Beamline
BLRSC…… .... Beamline Users Remote Shutter Control System
EPS..... Equipment Protection System
NC ..... Normally Closed Relay Contacts
NO..... Normally Open Relay Contacts
PLC ..... Programmable Logic Controller
PSS ..... Personnel Safety System
RSC ..... Remote Shutter Control
TBD..... To Be Determined
TB…….Terminal Block
AOD ..... Accelerator Operations Division

ICD PSS to Beamline User Remote Shutter Control

Revision Record

Revision	Dated	Comments
1	01/20/98	Initial Draft
2	03/02/99	Update
3	02/02/01	Update
4	06/07/01	Update

ICD PSS to Beamline User Remote Shutter Control

1 SCOPE

This document applies to all versions of the PSS installed at the APS.

2 APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein.

2.1 APS Documents

Document No. 1111-00001-00 APS Quality Assurance Plan, dated May 1990.
Document No. Validation_Procedure_Remote_Shutter_E000P_900TBD.doc

2.2 Drawings

"REMOTE SHUTTER WIRING"
Drawing No. Remote_Shutter_Wiring_E000P_2xxxxx (TBR) (formerly 41020203)

2.3 Precedence

In the event of conflict between the provisions of this specification and other documents, the following precedence shall apply:

This specification. Documents referenced to the extent referenced herein.

3 SYSTEM OVERVIEW

The main function of the interface between the Personnel Safety System (PSS) and the Beamline Users Remote Shutter Control System (BLRCS) is to provide a means for the User to open and close the FE and BL shutters via a remote control system rather than manually. The open commands will be performed only if all the PSS interlocks are satisfied. In addition, the interface chassis guards the integrity of the PSS from excessive voltages from the Users system.

The interface is a chassis normally mounted in the back of the PSS end rack on the mezzanine. This chassis converts each contact closure request from the BLRSC to a 24 volt input signal at the Allen Bradley Chain A PLC. Also provided for is a means of testing the system. With a key switch one can choose between REMOTE mode (the BLRSC requests are the inputs) and TEST mode where the front panel pushbuttons are the inputs.

A block diagram of the interface is shown in Figure 3-1 below.

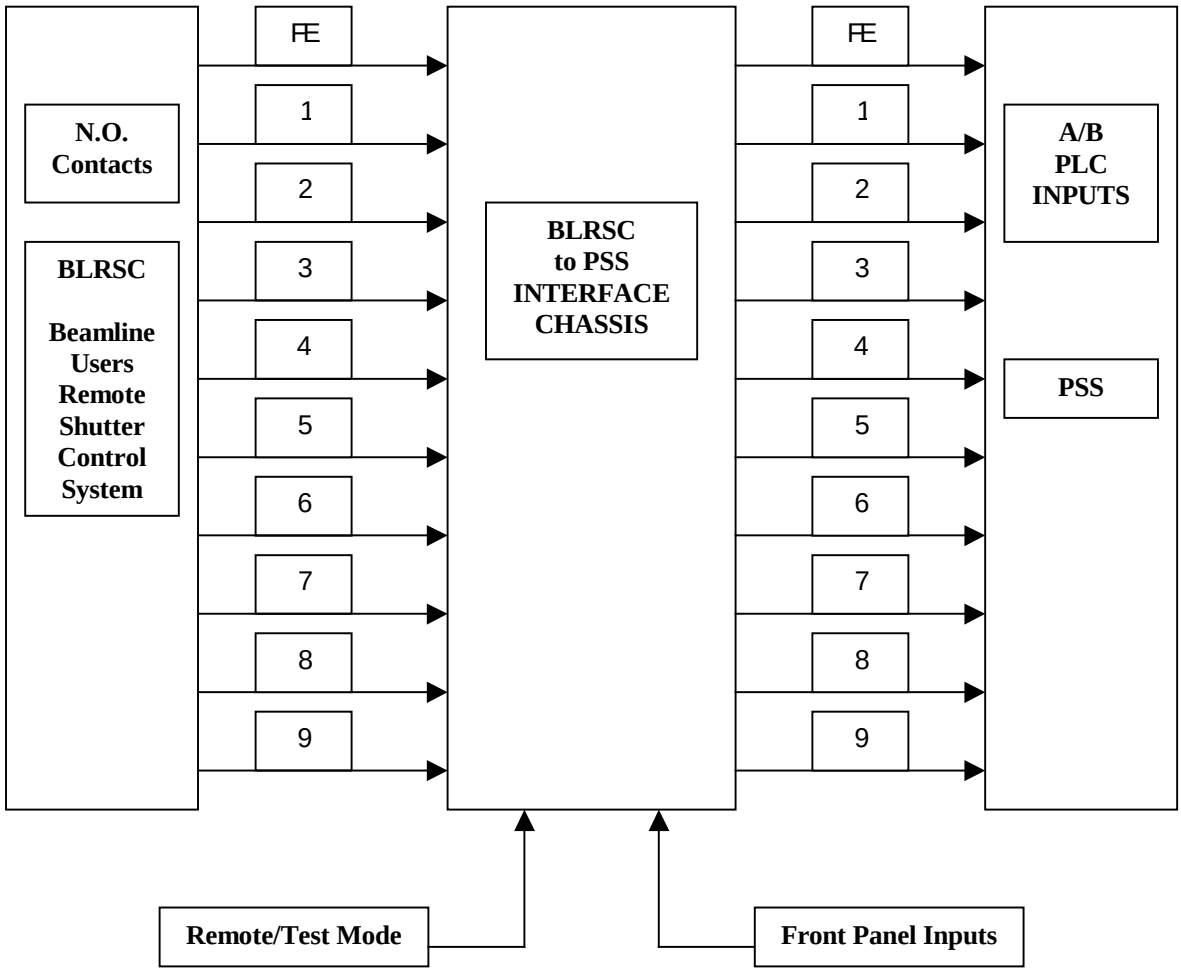


Figure 3-1 Interface Block Diagram

4 RESPONSIBILITIES

Signal exchange between the two systems is as follows.

4.1 Beamline User Remote Shutter Control Request

4.1.1 Description

The ***Shutter Request*** signal originates in the User rack containing control electronics. This signal goes through the BLRSC-PSS interface and requests the PSS to operate a shutter. The primary purpose is to allow remote operation of the FE and beamline shutters.

4.1.2 Operation

The ***Shutter Request*** signal is a contact closure across a wire pair. There is a wire pair for an OPEN request and a pair for a CLOSE request for each shutter. These OPEN/CLOSE requests will respond as if the pushbuttons on the User Panel were activated**. The PSS requires only momentary (more than 300 ms) requests; the contact should not remain closed.** The PLC has a typical scan time of 30-50 ms and the shutter takes about 1 sec to open and .5 sec to close. This results in the 300 ms specification for contact closure duration and a 2 sec response time for the shutter.

In the case of a request to open a shutter, the PSS will perform the operation only if conditions are safe to do so. For a shutter close request, the operation will always be performed.

In the case of the BLRSC requesting a shutter to open and close simultaneously, the PSS software will see an open and a close command and will honor only the shutter close signal.

4.1.3 Responsibility

The ***Shutter Request*** signal is the responsibility of the beamline User.

4.2 Physical Requirements

The physical requirements for the interface are the accessibility and identification requirements. The terminal blocks (TB's) at the BLRSC end of the Alpha 25 conductor input cable shall be placed such that there is sufficient space around them to allow access for testing and troubleshooting. These TB’s require labels be placed identifying them as part of the BLRSC to PPS interface. The cable requires labels be placed at both ends.

4.3 Mechanical Interface

The PSS mechanical interface is a bank of Phoenix connectors located at the chassis inside the PSS mezzanine rack. The User interface are terminal blocks or terminal strips selected by the user and mounted in the BLRSC equipment rack. Devices that interface the signals between the BLRSC and PSS include TB's/terminal strips, mounting rails, and cable.

4.3.1 PSS Interface Parts

Cable Specification

A multiconductor instrumentation/process control cable shall be used for the interface. The cable is a 25 conductors, 20 AWG, overall foil shielded Alpha No. 45470/25. The jacket is of high/low temperature thermoplastic rubber construction. The cable is classified as Power Limited Tray Cable (PLTC) 300 volts. The tray cable is a factory-assembled multiconductor or multipair signal, control, or power cable specifically approved under the National Electrical Code (NEC) for installation in cable trays.

Pulling the interface cable between the PSS and BLRSC cabinets is the responsibility of the APS Accelerator Operations Division.

Terminating the cable in the PSS End Rack and installing the necessary labels is the responsibility of the APS Accelerator Operations Division. **The cable drain wire shall be connected to ground at the PSS End Rack only.**

Terminating the cable in the user's rack and installing the necessary labels is the responsibility of the user.

4.3.2 BLRSC Interface Parts

The interface parts are to be determined by the user.

Control relays, (mechanical or solid state) which are needed for interfacing the USERS commands to the BLRSC chassis, shall be provided by the user and installed in the user's cabinet.

4.4 Electrical/Electronic Interfaces

4.4.1 The +24VDC voltage level is supplied from the BLRSC Interface chassis so the USER is to provide only a passive contact closure (or isolated solid state relay) across a wire pair for each request. This relay shall be rated for 200 Volts DC of input to output isolation.

4.4.2 The request inputs to the interface shall be wired as shown in the attached figure.

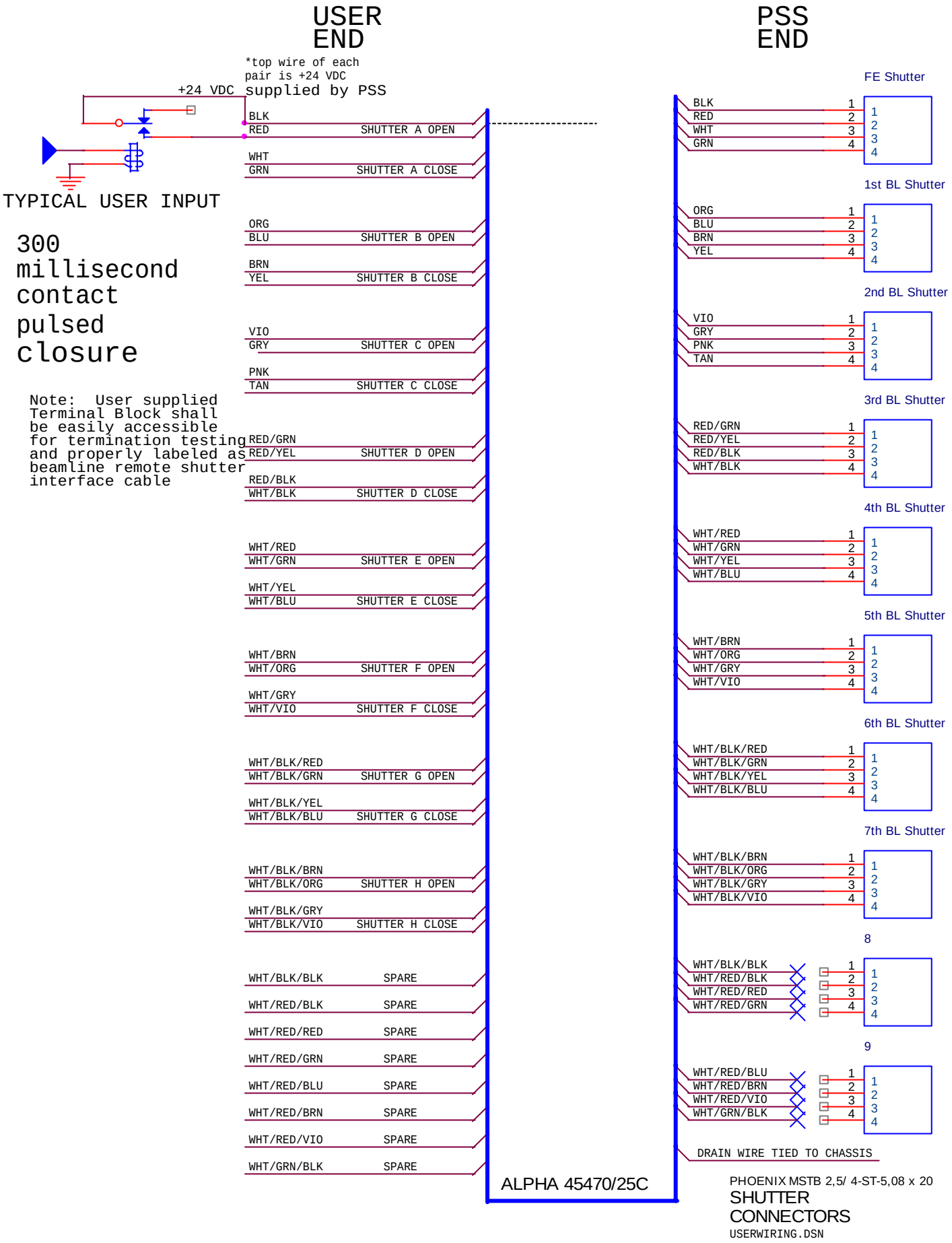
5 SAFETY CONSIDERATIONS

5.1 Voltage

Low voltage DC circuitry is used for status and control signals (+24VDC).

5.2 Fail Safe

By using normally open (NO) status switches, sets of NO relay contacts, and positive logic, 'true high +24V', the system is inherently fail-safe to faults such as loss of power or open circuits.

Following page, Figure 5-2 User Wiring Diagram (USERWIRING.DSN)

ICD PSS to Beamline User Remote Shutter Control